

# CASE REPORT

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## HEPATIC PORTAL VENOUS GAS FOLLOWING COLONOSCOPY IN A PATIENT WITH CROHN'S DISEASE

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### ABSTRACT

Hepatic portal venous gas is a rare condition that occurs when intraluminal gas or gas produced by intestinal bacteria enters the portal venous circulation. It has recently been recognized as a rare complication of colon procedures by endoscopy or barium enema. Given the frequency of these procedures in patients with inflammatory bowel disease, hepatic portal venous gas may occur more frequently in these patients than previously reported. Here, we report a woman with Crohn's disease who developed hepatic portal venous gas following colonoscopy who was treated with conservative therapy.

Key words; Hepatic portal venous gas, inflammatory bowel disease

### INTRODUCTION

Hepatic portal venous gas (HPVG) was first described in 1955 in an infant with fatal necrotizing enterocolitis,<sup>1)</sup> and subsequently reported in adults.<sup>2)</sup> It is a rare condition with numerous etiologies, including bowel infarction, necrotizing enterocolitis, closed loop obstructions, acute hemorrhagic pancreatitis, granulomatous enterovenous fistula, pseudomembranous colitis, gastric ulcer, and gastric emphysema. Intracorporeal factors such as damaged mucosa and bowel distension may be responsible for the passage of gas into the portal system. Reports of iatrogenic causes, such as barium enema and endoscopy, have recently increased, particularly among patients with inflammatory bowel disease.<sup>3)</sup>

Here, we describe a 54-year-old woman with Crohn's disease who developed HPVG following colonoscopy by double balloon endoscopy, and was successfully managed conservatively. We also provide a review of literature on this condition.

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## CASE REPORT

A 54-year-old-woman presented to a general practitioner with a two-day history of abdominal pain and nausea. Abdominal radiography on initial consultation revealed niveau formation, leading to a diagnosis of ileus, and she was hospitalized in a local hospital under conservative treatment for two days. History included Crohn's disease, which was pathologically diagnosed in 1977 following partial ileectomy for acute lower abdominal pain. She subsequently underwent two further partial ileectomies, as well as hysterectomy for uterine myoma in 1998 and ileocolostomy in 2003. However, she had no history of biliary surgery or instrumentation. Her compliance with regular follow-up visits and medication for Crohn's disease was poor.

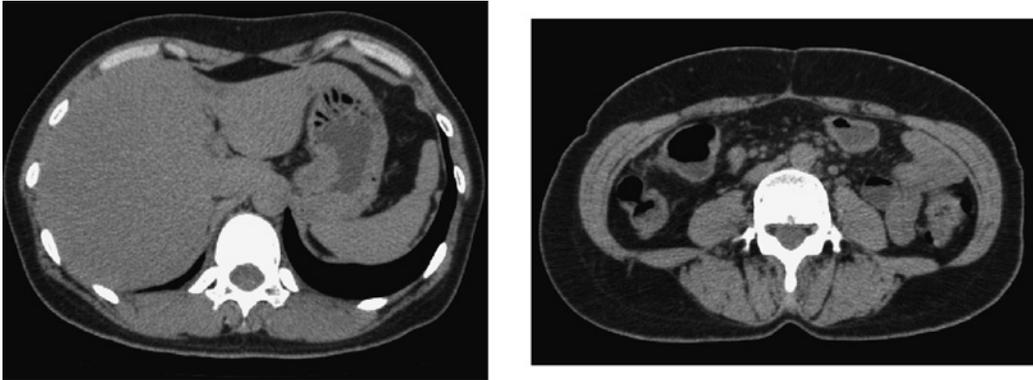
She was subsequently transferred to our hospital for further examination and treatment. At the time of transfer, her abdominal pain and tenderness were markedly diminished. Abdominal computed tomography (CT) assessment did not identify niveau formation, and her ileus was improved (Figure 1). Gastrografin examination of the small intestine on Day 3 of hospitalization revealed constriction of the terminal ileum for about 10 cm from the site of the previous operative anastomosis (Figure 2). The jejunum was normal. The cause of the ileus was constriction due to the exacerbation of Crohn's disease. Double balloon endoscopy (DBE) for the ileum and colon did not reveal mucosal damage, and revealed the stricture at the anastomotic site due to the previous operation (Figure 3). The extent of narrowing was eventually confirmed by contrast enema using gastrografin during DBE. After endoscopy, we checked the abdominal CT to aid in research into virtual endoscopy (Figure 4). Although she did not report abdominal pain following endoscopy, the abdominal CT revealed multiple small tubular lucencies in the periphery of the liver, indicating the presence of HPVG. Given the lack of symptoms (no fever or abdominal pain), we selected conservative therapy with the cessation of oral ingestion, and started a two-day prophylactic course of antibiotics. Three days after examination, she had no symptoms, so we started enteral feeding of an elemental diet. Abdominal CT six days after examination revealed no HPVG (Figure 5).

## DISCUSSION

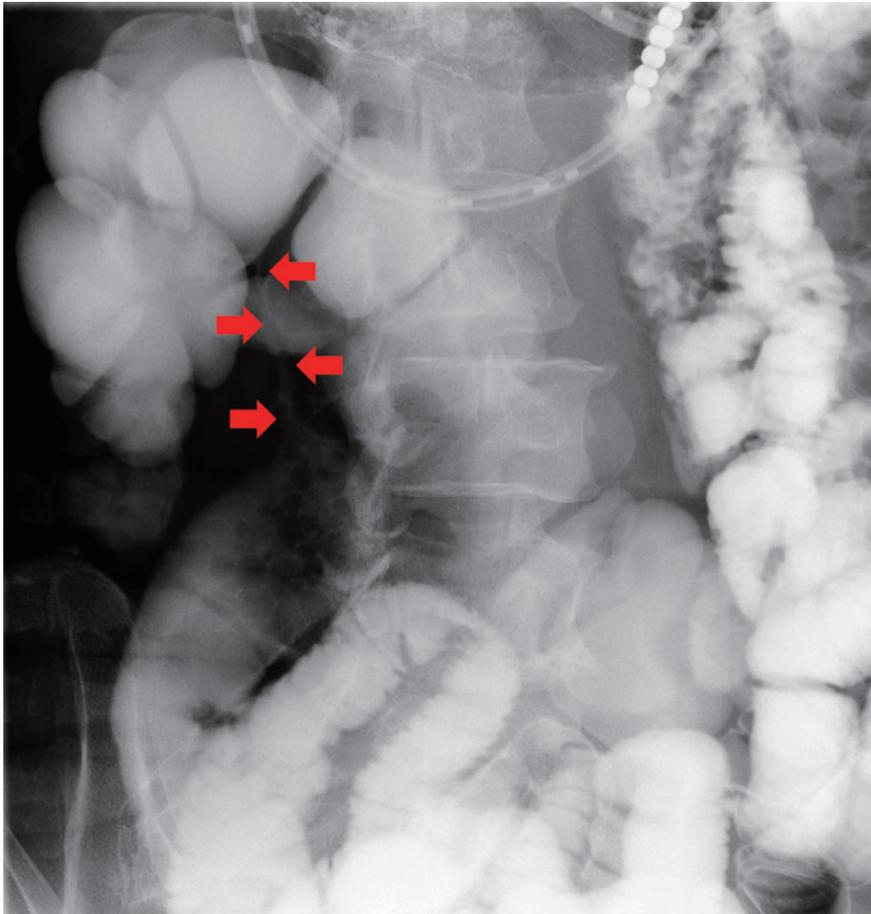
The finding of HPVG can be associated with either benign or critical conditions that require immediate surgery. HPVG is speculated to arise from two sources, the escape of bowel gas as a result of increased pressure in the bowel lumen or in an abscess, followed by circulation into the liver; or the presence of gas-forming bacteria in the portal venous gas system and passage of gas into the circulation. HPVG appears on plain abdominal radiography or CT as linear radiolucencies extending to within 2 cm of the periphery of the liver.<sup>4)</sup> In contrast to biliary air, which is central and almost never extends to the periphery, gas in the portal venous system is likely transported to the small peripheral branches in the liver by the centrifugal flow of the portal venous blood.<sup>3)</sup> Recently, ultrasonography has been used for the diagnosis of HPVG.<sup>5)</sup> Although most cases of HPVG in critical conditions are caused by mesenteric vascular occlusion and subsequent bowel necrosis, it can also arise due to various other conditions. Benign causes for HPVG include administration of fluids via an umbilical catheter, barium enema, and colonoscopy.

The present HPVG case was a Crohn's disease patient, and HPVG occurred following colonoscopy. This case is the 12th case of HPVG associated with inflammatory bowel disease (ulcerative colitis and Crohn's disease) following examination of colon reported to date (Table 1). Of these, five patients were asymptomatic and required no specific treatment, apart from prophylactic antibiotics in several. One patient experienced abdominal pain and received antibiotics before

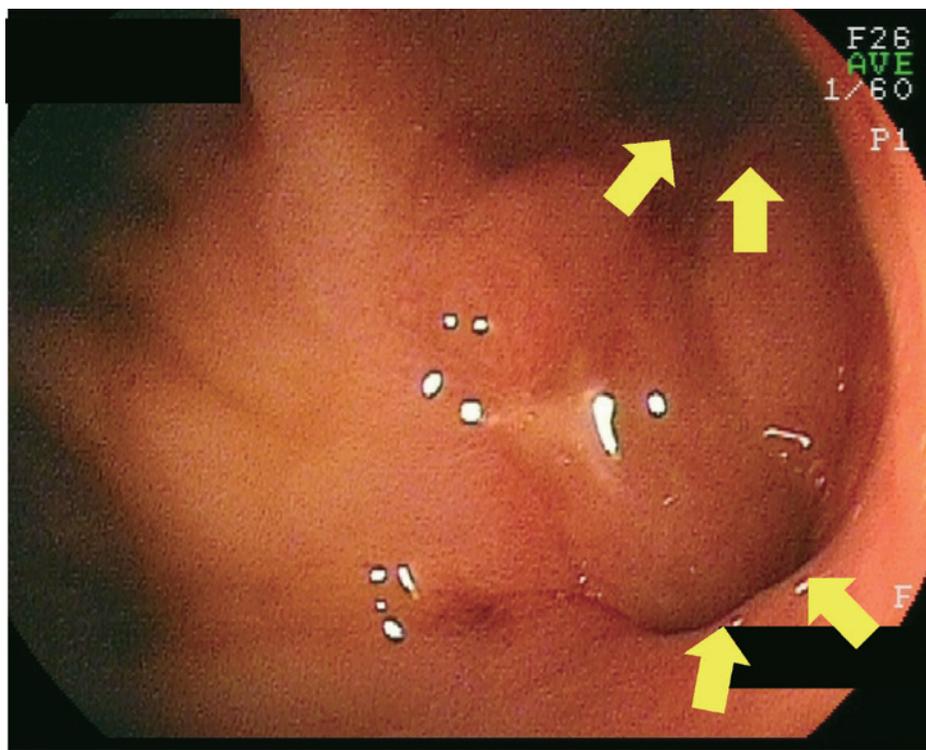
## HEPATIC PORTAL VENOUS GAS AND CROHN'S DISEASE



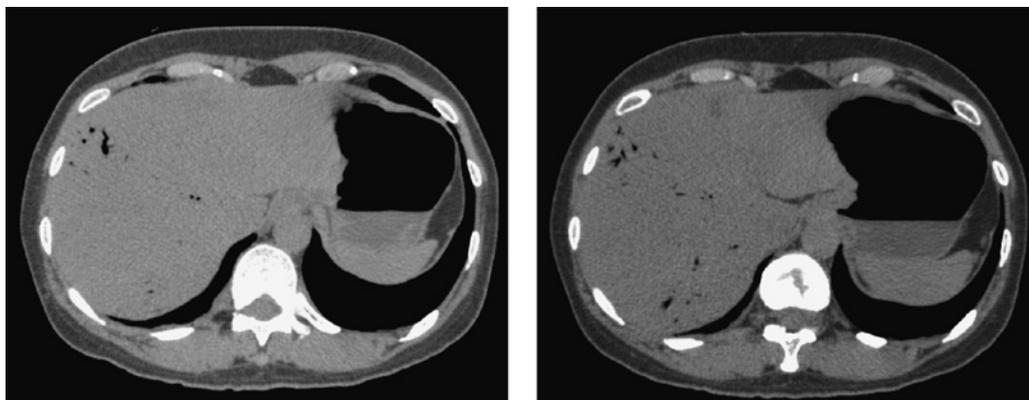
**Fig. 1** Abdominal CT at the time of transfer to our hospital showed no niveau formation, and the amelioration of ileus. Hepatic portal venous gas was not seen.



**Fig. 2** Gastrografin examination of the small intestine revealed constriction of the terminal ileum for about 10 cm and the ileum-colon (check) anastomosis (arrows).



**Fig. 3** The anastomotic region (arrows) of a previous side-to-side anastomosis. No mucosal lesions were found.



**Fig. 4** Computed tomography demonstrated gas in the peripheral branches of the portal vein following colonoscopy.

finally recovering under conservative therapy. For patients with HPVG who are asymptomatic, we suggest that prophylactic antibiotics are not required. Although two patients required surgery for intestinal perforation,<sup>7,12)</sup> all 12 patients survived.

The bowel wall in inflammatory bowel diseases such as ulcerative colitis and Crohn's disease

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**Fig. 5** Computed tomography six days after examination did not identify hepatic portal venous gas.

**Table 1** Clinical features, study, diagnostic modality, treatment, and outcome in 12 patients with inflammatory bowel disease with hepatic portal venous gas associated with examination of colon.

Author	Sex	Age	Disease	Study	Clinical features	Diagnostic modality	Treatment	Outcome
Kees <i>et al.</i> <sup>16)</sup>	F	44	UC	Barium enema (BE)	low grade fever	plane X-ray	antibiotics	survived
Lazar <sup>7)</sup>	M	48	UC	BE	severe abdominal pain, perforation of colon	plane X-ray	surgery	survived
Weinstein <i>et al.</i> <sup>8)</sup>	M	35	UC	BE	fever	plane X-ray	antibiotics	survived
Liebman <i>et al.</i> <sup>2)</sup>	M	23	UC	BE	shaking chill	plane X-ray	antibiotics	survived
Sadhu <i>et al.</i> <sup>9)</sup>	F	65	CD	BE	none	plane X-ray	none	survived
Christensen <i>et al.</i> <sup>10)</sup>	M	71	UC	BE	abdominal pain lasting 4 hours	plane X-ray	none	survived
Pappas <i>et al.</i> <sup>11)</sup>	M	36	CD	Sigmoidoscopy BE	none	plane X-ray	none	survived
Huycke <i>et al.</i> <sup>12)</sup>	M	22	CD	colonoscopy	abdominal pain and free peritoneal air	plane X-ray	surgery	survived
Katz <i>et al.</i> <sup>13)</sup>	M	14	CD	BE	none	plane X-ray	antibiotics	survived
Salyers <i>et al.</i> <sup>3)</sup>	M	24	CD	colonoscopy	none	plane X-ray	none	survived
Alqahtani <i>et al.</i> <sup>14)</sup>	F	26	CD	colonoscopy	abdominal pain	CT	antibiotics	survived
present case	F	54	CD	colonoscopy	none	CT	antibiotics	survived

is often severely damaged. It has been speculated that elevated intraluminal pressure during colonic diagnostic procedures or due to constriction of the intestine can permit bowel gas or gas-forming bacteria to access the portal venous circulation through microscopic mucosal injury, and HPVG associated with inflammatory bowel disease often results from barium enema or colonoscopy. In the absence of peritoneal signs or free air, HPVG is a benign finding in patients with inflammatory bowel disease following diagnostic studies of the intestine.

The recent development of endoscopy equipment, including double balloon endoscopy, has facilitated detailed observation of the intestinal tract, and generally increased the number of examinations in patients with inflammatory bowel disease. HPVG might accordingly occur more frequently than in the past. Because imaging tests such as CT which identify HPVG are not routinely obtained after examination, there may be more asymptomatic HPVG cases which are not diagnosed. In present case, if we had not conducted research into virtual endoscopy, the abdominal CT might not have been carried out. Immediate use of imaging tests is required if the patient has subjective symptoms, such as abdominal pain and high fever. Although HPVG often improves under observation and is rarely serious situation, adverse outcomes could also occur, mandating that HPVG be considered as a complication of examinations of the colon or small intestine in inflammatory bowel disease.

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